

CLAIMS

1. A photodetector comprising:

N photodiodes (N being an integer of 2 or greater) each generating an electric charge by an amount corresponding to an intensity of light incident thereon;

N electric charge amount level determining circuits, respectively arranged so as to correspond to the N photodiodes, for determining respective levels of amounts of electric charges generated in the photodiodes and outputting respective level signals indicative of results of level determinations;

an integrating circuit including an integral capacitance part having a variable capacitance value, which is set according to the level signal, accumulating an electric charge fed from the input terminal into the integral capacitance part, and outputting a voltage corresponding to an amount of the accumulated electric charge, from the output terminal;

first switches respectively provided so as to correspond to the N photodiodes, and arranged between the respective photodiodes and the input terminal of the integrating circuit; and

second switches respectively provided so as to correspond to the N electric charge amount level determining circuits, and arranged between the respective electric charge amount level determining circuits and the integral capacitance part.

2. The photodetector according to claim 1, further comprising an A/D converter circuit for inputting the voltage outputted from the output terminal of the integrating circuit, A/D-converting the voltage into a digital value corresponding to the voltage, and outputting

the digital value.

3. The photodetector according to claim 2, further comprising a shift circuit for inputting the digital value outputted from the A/D converter circuit, shifting a bit of the digital value according to
5 the level signal, and outputting the digital value having the shifted bit.

4. The photodetector according to claim 3, wherein the integral capacitance part is settable to a first or second capacitance value;
wherein the first capacitance value is 2^p times as large as the second capacitance value (p being an integer of 1 or greater);
10 wherein the A/D converter circuit outputs a digital value with a bit number of p or greater; and
wherein the shift circuit shifts the digital value by p bits according to the level signal.

5. The photodetector according to claim 1, further comprising a control circuit for controlling opening and closing of each
15 of the first and second switches;
wherein, for each of the N photodiodes, the control circuit closes the second switch and, after the capacitance value of the integral capacitance part is set according to the level signal outputted from the
20 electric charge amount level determining circuit corresponding to the photodiode, closes the first switch corresponding to the photodiode.

6. The photodetector according to claim 1, comprising M sets (M being an integer of 2 or greater) each composed of the N photodiodes, the N electric charge amount level determining circuits, and
25 the integrating circuit.

7. The photodetector according to claim 1, comprising:

the N photodiodes arranged on a first substrate; and

the N electric charge amount level determining circuits, integrating circuit, first switches, and second switches arranged on a second substrate;

- 5 wherein the first and second substrates are connected to each other with a bump, the photodiodes and the first switches corresponding thereto are electrically connected to each other, and the photodetectors and the electric charge amount level determining circuits corresponding thereto are electrically connected to each other.